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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
VINH, LAN

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 03/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MF=5

Office Action Summary	Application No. 09/662,682	Applicant(s) LI ET AL.
	Examiner LAN VINH	Art Unit 1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 7, 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7, 17 are indefinite for use of improper Markush language. The examiner suggests replacing "selected from the group of" with –selected from the group consisting of-

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-7, 9, 10-17, 19, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al (US 6,093,941) in view of Yoshikawa et al. (US 5,990,605).

Russell discloses a method for making light emitting structure. This method comprises the steps of:

forming/depositing an electrode layer of metal on a silicon surface (col 8, lines 21-22)

etching the silicon surface in a HF and HNO_3/ oxidant for 2 minute (overlaps the claimed etching period of about 2 sec to 60 minutes) (col 5, lines 40-44), the etching step requires no electrical current (col 5, lines 24-26) reads on etching being conducted without external electrical bias

Unlike the instant claimed inventions as per claims 1, 4-7, 9, 11, 14-17, Russell does not specifically discloses depositing a thin (less than 10 nm) discontinous layer of metal (Pt, Au, Pd) on a Si surface although Russsell does disclose forming a layer of metal on a Si surface.

However, Yoshikawa discloses a method for forming light emitting device comprises the step of forming a thin (2-20nm) discontinuous metal (Au, Pt, Pd) electrode 15 layer on a Si surface 13 (col 7, lines 32-54 and fig. 2 shows a discontinuous thin metal layer 15 on Si surface 13)

Since both Russell and Yoshikawa are concerned with method of forming light-emitting device, it would have been obvious for one skilled in the art to modify Russell by forming a thin discontinuous metal layer on the Si surface as per Yoshikawa especially since Yoshikawa teaches that when considering the stability as an electron/light emission device a thin (2-20 nm) is the most suitable for the Au or Pt thin film electrode (col 7, lines 53-55)

Regarding claims 3, 13, Russell discloses immersing the substrate in the etching solution and illuminating using laser (col 6, lines 3-5)

Regarding claims 2, 12, it would have been obvious for one skilled in the art to modify Russell by performing the etching step in the absence of illumination since Russell discloses that luminescence porous silicon can be produced using either chemical stain etch (without illumination) or a photochemical etch (with illumination) (col 6, lines 65-67)

The limitations as recited in claims 4-7, 9, 10, 14-17, 19-20 have been discussed above.

5. Claims 8, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al (US 6,093,941) in view of Yoshikawa et al. (US 5,990,605) and further in view of Yamagata et al (US 5,695,557)

Russell and Yoshikawa have been described above in paragraph 4. Russell and Yoshikawa differ from the instant claimed inventions as per claims 8, 18 by etching using HF and HNO_3/oxidant instead of HF and H_2O_2.

However, Yamagata teaches that the HF solution used in etching porous silicon layer comprises of a mixture of HF and H_2O_2 and the porous silicon can also be etched using a mixed solution of HF and HNO_3 (col 10, lines 61-64)

Hence, one skilled in the art would have found it obvious to substitute Russell and Yoshikawa etching solution of HF and HNO_3 with etching solution of HF and H_2O_2 in view of Yamagata teaching because both etching solutions have the same function of etching porous silicon ; therefore, the substitution of one for the other would have been anticipated to produce an expected result.

6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al (US 6,093,941) in view of Yoshikawa et al. (US 5,990,605).

Russell discloses a method for making light emitting structure. This method comprises the steps of:

forming/depositing an electrode layer of metal on a silicon surface (col 8, lines 21-22)

etching the silicon surface in a HF and HNO_3/ oxidant for 2 minute (overlaps the claimed etching period of about 2 sec to 60 minutes) (col 5, lines 40-44), the etching step requires no electrical current (col 5, lines 24-26) reads on etching being conducted without external electrical bias

Unlike the instant claimed inventions as per claim 21, Russell does not specifically disclose depositing metal on a Si surface in a thickness sufficient to permit nucleation that forms nanometer size metal particles and small enough to prevent formation of a continuous metal layer although Russsell does disclose forming a layer of metal on a Si surface.

However, Yoshikawa discloses a method for forming light emitting device comprises the step of forming a thin (2-20nm) metal (Au, Pt, Pd) 15 layer on a Si surface 13 (col 7, lines 32-54). Since Yoshikawa discloses forming the same thin metal (Au, Pt, Pd) layer having the same thickness (less than 10 nm) on a Si surface as the claimed invention, Yashikawa's thin metal layer functions as a metal in a thickness sufficient to permit nucleation that forms nanometer size metal particles and small enough to prevent formation of a continuous metal layer based on the fact that the

applicants discloses that thin metal (Pt, Au) coating on Si appear as nanometer size (~ 10 nm) island prior to etching (page 7 of the specification)

Since both Russell and Yoshikawa are concerned with method of forming light-emitting device, it would have been obvious for one skilled in the art to modify Russell by forming a thin metal layer on the Si surface as per Yoshikawa especially since Yoshikawa teaches that when considering the stability as an electron/light emission device a thin (2-20 nm) is the most suitable for the Au or Pt thin film electrode (col 7, lines 53-55)

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is 703 305-6302. The examiner can normally be reached on Monday-Friday 8:30 -6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, BENJAMIN L UTECH can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

LV
December 5, 2001

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
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